DESCRIPTION

This new series of digital transistors is designed to replace a single device and its external resistor bias network. The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base–emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space. The device is housed in the SC-70 package which is designed for low power surface mount applications.

The MUN5111~ MUN5137 is available in SC-70 Package

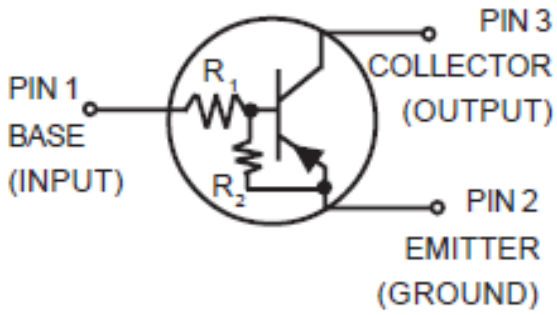
ORDERING INFORMATION

Package Type	Part Number
SC-70	MUN5111
	MUN5112
	MUN5113
	MUN5114
	MUN5115
	MUN5116
	MUN5130
	MUN5131
	MUN5132
	MUN5133
	MUN5134
	MUN5135
	MUN5136
	MUN5137
Note	3,000pcs/Reel
AiT provides all RoHS Compliant Products	

FEATURES

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The modified gull–winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- Available in SC-70 Package

PIN DESCRIPTION



ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted

V_{CBO}, Collector-Base Voltage	50Vdc
V_{CEO}, Collector-Emitter Voltage	50Vdc
I_C, Collector Current	100mAdc

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

Parameter		Symbol	Max.	Unit
Total Device Dissipation	T_A = 25°C	P_D	202[NOTE1] 310[NOTE2]	mW
	Derate above 25°C		1.6[NOTE1] 2.5[NOTE2]	°C/W
Thermal Resistance-Junction-to-Ambient		$R_{\theta JA}$	618[NOTE1] 403[NOTE2]	°C/W
Thermal Resistance -Junction-to-Lead		$R_{\theta JL}$	280[NOTE1] 332[NOTE2]	°C/W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

NOTE1: FR–4 @ Minimum Pad
NOTE2: FR–4 @ 1.0 x 1.0 inch Pad

ELECTRICAL CHARACTERISTICS

T_A = 25°C unless otherwise noted

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS							
Collector-Base Cutoff Current	I_{CBO}	V_{CB} = 50V, I_E = 0		-	-	100	nAdc
Collector-Emitter Cutoff Current	I_{CEO}	V_{CE} = 50V, I_B = 0		-	-	500	nAdc
Emitter-Base Cutoff Current	I_{EBO}	V_{EB} = 6.0V, I_C = 0	MUN5111	-	-	0.5	mAdc
			MUN5112			0.2	
			MUN5113			0.1	
			MUN5114			0.2	
			MUN5115			0.9	
			MUN5116			1.9	
			MUN5130			4.3	
			MUN5131			2.3	
			MUN5132			1.5	
			MUN5133			0.18	
			MUN5134			0.13	
			MUN5135			0.2	
			MUN5136			0.05	
			MUN5137			0.13	
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0		50	-	-	Vdc
Collector-Emitter Breakdown Voltage NOTE 3	$V_{(BR)CEO}$	I_C = 2.0mA, I_B = 0		50		-	Vdc

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
ON CHARACTERISTICS[NOTE3]							
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 5.0mA	MUN5111	35	60	-	
			MUN5112	60	100		
			MUN5113	80	140		
			MUN5114	80	140		
			MUN5115	160	250		
			MUN5116	160	250		
			MUN5130	3.0	5.0		
			MUN5131	8.0	15		
			MUN5132	15	27		
			MUN5133	80	140		
			MUN5134	80	130		
			MUN5135	80	140		
			MUN5136	80	150		
			MUN5137	80	140		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10mA, I_E = 0.3mA		-	-	0.25	Vdc
		I_C = 10mA, I_B = 5mA	MUN5130				
			MUN5131				
		I_C = 10mA, I_B = 1mA	MUN5115				
			MUN5116				
			MUN5132				
			MUN5134				

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage (on)	V_{OL}	V_{CC} = 5.0V, V_B = 2.5V, R_L = 1.0kΩ	MUN5111	-	-	0.2	Vdc
			MUN5112				
			MUN5114				
			MUN5115				
			MUN5116				
			MUN5130				
			MUN5131				
			MUN5132				
			MUN5133				
			MUN5134				
			MUN5135				
		V_{CC} = 5.0V, V_B = 3.5V, R_L = 1.0kΩ	MUN5113				
		V_{CC} = 5.0V, V_B = 5.5V, R_L = 1.0kΩ	MUN5136				
		V_{CC} = 5.0V, V_B = 4.0V, R_L = 1.0kΩ	MUN5137				
Output Voltage (off)	V_{OH}	V_{CC}=5.0V, V_B=0.5 V, R_L=1.0kΩ		4.9	-	-	Vdc
		V_{CC} = 5.0V, V_B = 0.05V, R_L = 1.0kΩ	MUN5130				
		V_{CC} = 5.0V, V_B = 0.25V, R_L = 1.0kΩ	MUN5115				
			MUN5116				
			MUN5131				
			MUN5132				

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Input Resistor	R_1		MUN5111	7.0	10	13	kΩ
			MUN5112	15.4	22	28.6	
			MUN5113	32.9	47	61.1	
			MUN5114	7.0	10	13	
			MUN5115	7.0	10	13	
			MUN5116	3.3	4.7	6.1	
			MUN5130	0.7	1.0	1.3	
			MUN5131	1.5	2.2	2.9	
			MUN5132	3.3	4.7	6.1	
			MUN5133	3.3	4.7	6.1	
			MUN5134	15.4	22	28.6	
			MUN5135	1.54	2.2	2.86	
			MUN5136	70	100	130	
			MUN5137	32.9	47	61.1	
Resistor Ratio	R_1 /R_2		MUN5111	0.8	1.0	1.2	
			MUN5112				
			MUN5113				
			MUN5136				
			MUN5114	0.17	0.21	0.25	
			MUN5115	-	-	-	
			MUN5116				
			MUN5130	0.8	1.0	1.2	
			MUN5131				
			MUN5132				
			MUN5133	0.055	0.1	0.185	
			MUN5134	0.38	0.47	0.56	
			MUN5135	0.038	0.047	0.056	
			MUN5137	1.7	2.1	2.6	

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

TYPICAL CHARACTERISTICS

MUN5111

Figure 1. Derating Curve

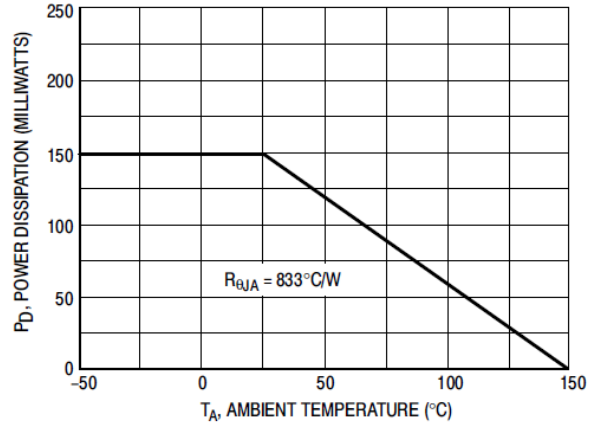


Figure 2. $V_{CE(sat)}$ versus I_C

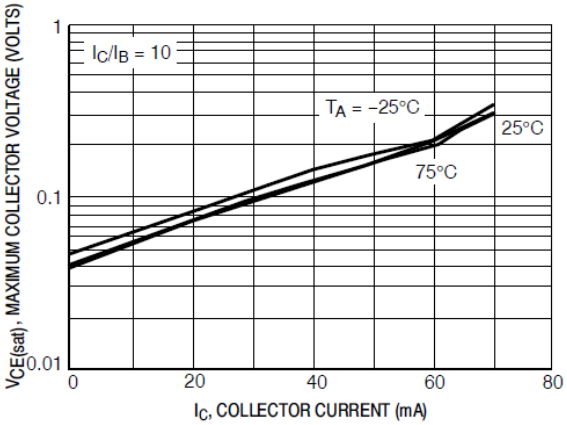


Figure 3. DC Current Gain

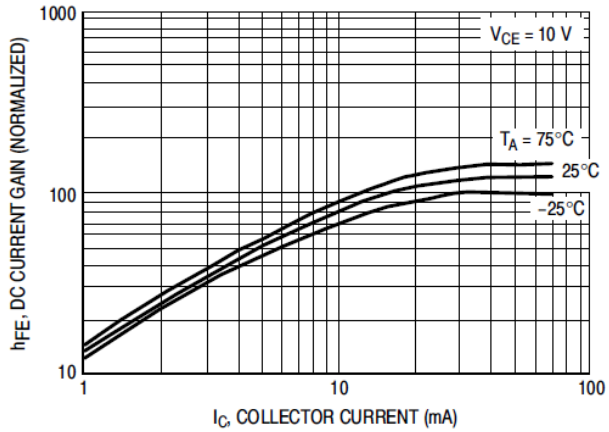


Figure 4. Output Capacitance

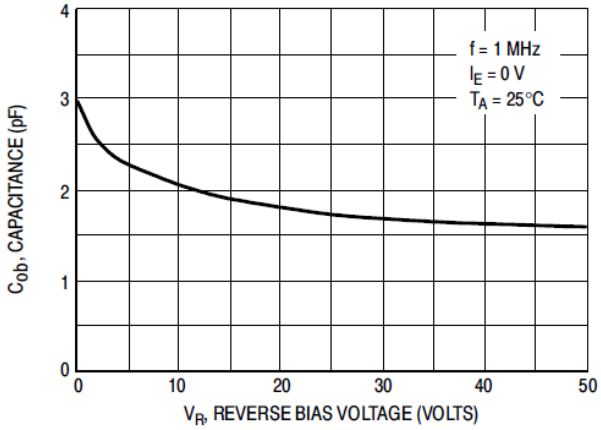


Figure 5. Output Current versus Input Voltage

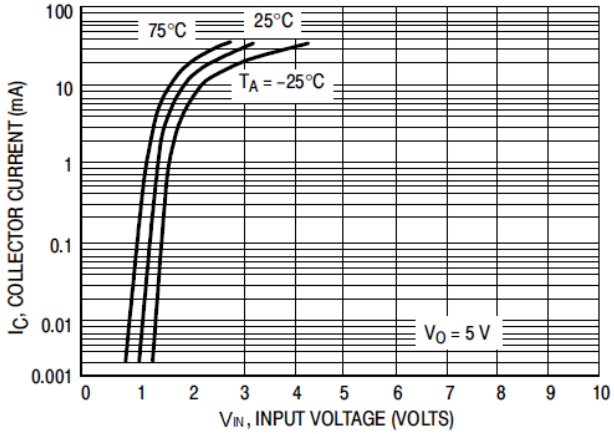
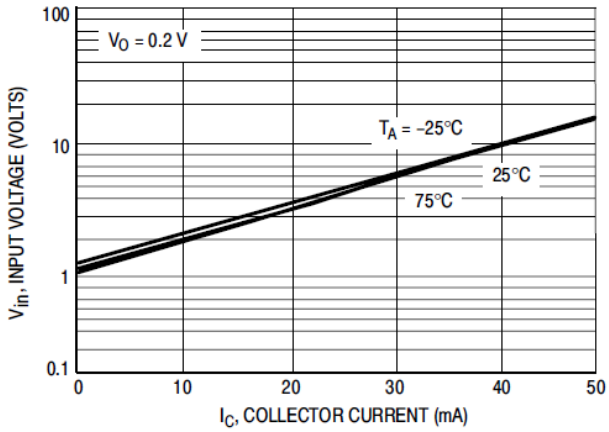


Figure 6. Input Voltage versus Output Current



MUN5112

Figure 7. $V_{CE(sat)}$ versus I_C

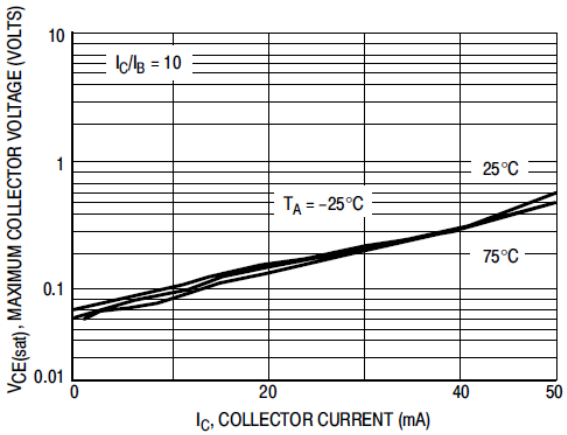


Figure 8. DC Current Gain

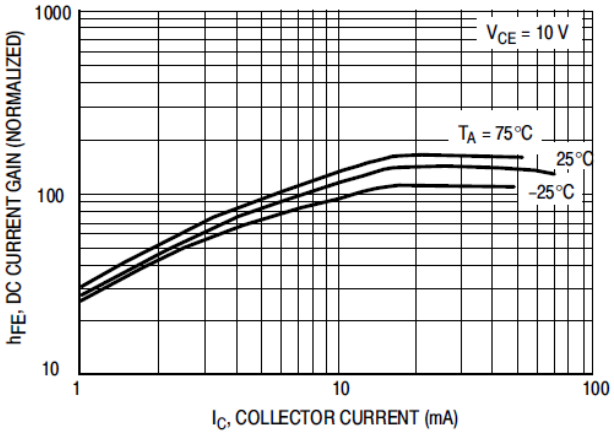


Figure 9. Output Capacitance

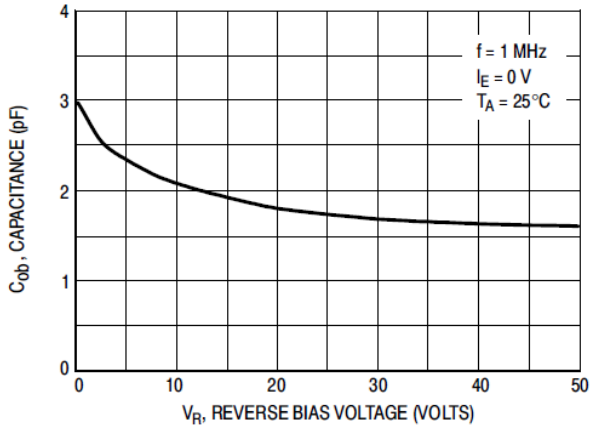


Figure 10. Output Current versus Input Voltage

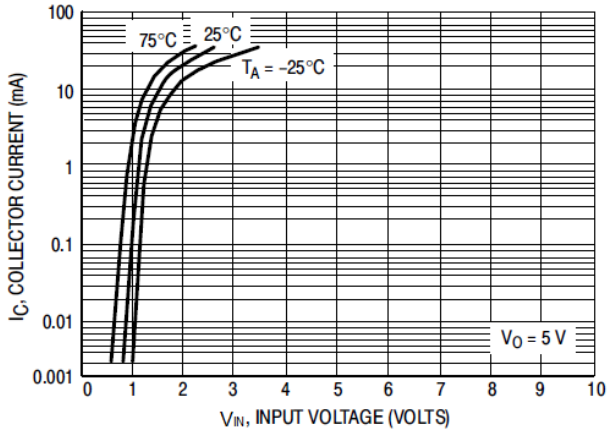
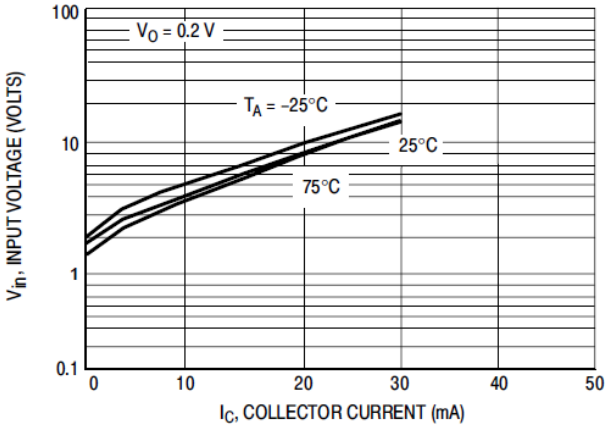


Figure 11. Input Voltage versus Output Current



MUN5113

Figure 12. $V_{CE(sat)}$ versus I_C

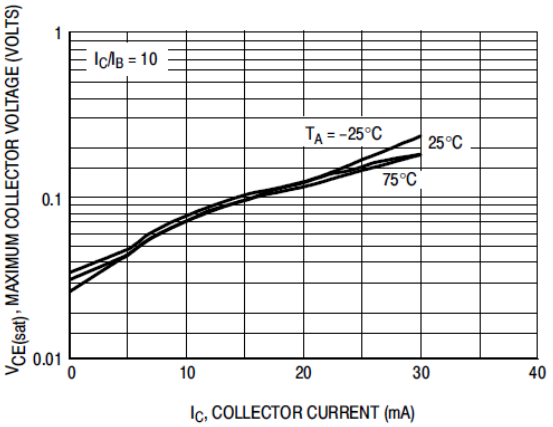


Figure 13. DC Current Gain

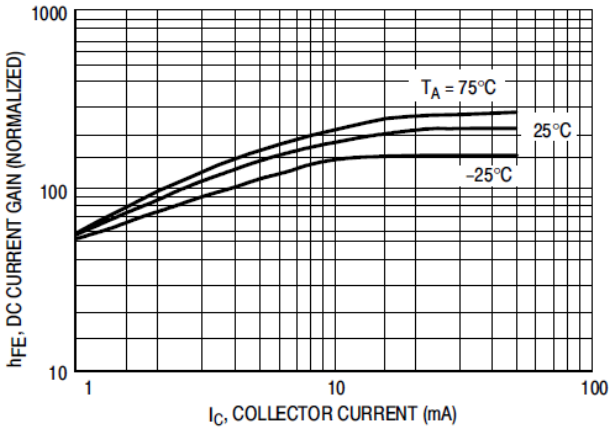


Figure 14. Output Capacitance

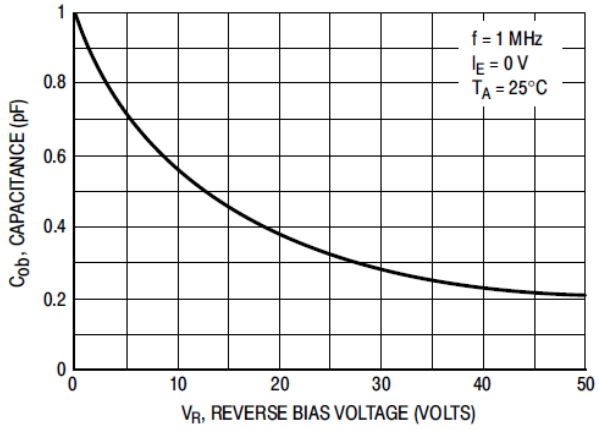


Figure 15. Output Current versus Input Voltage

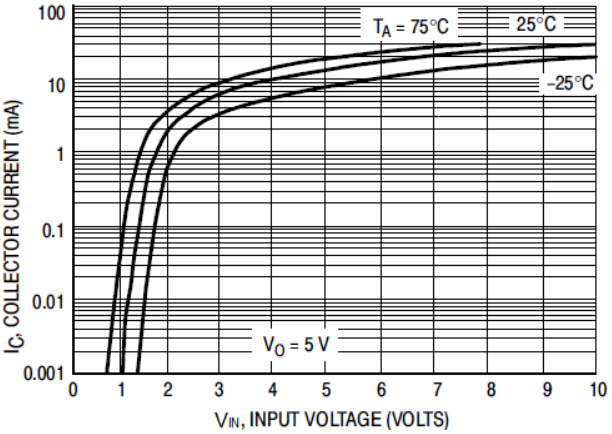
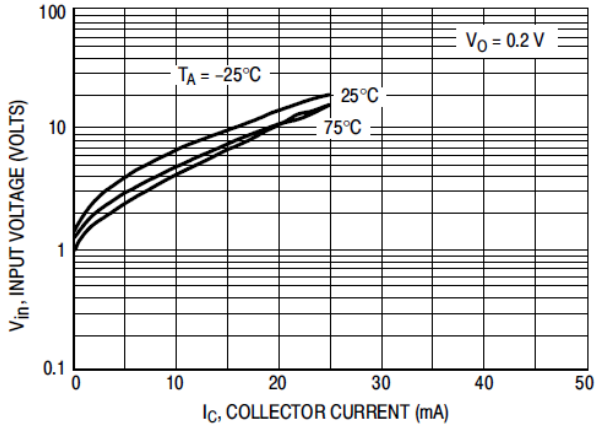


Figure 16. Input Voltage versus Output Current



MUN5114

Figure 17. $V_{CE(sat)}$ versus I_C

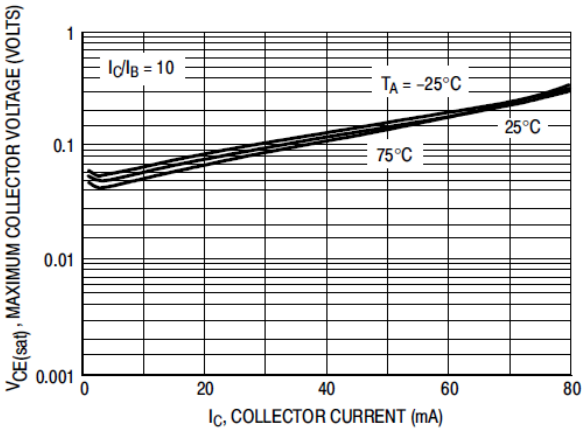


Figure 18. DC Current Gain

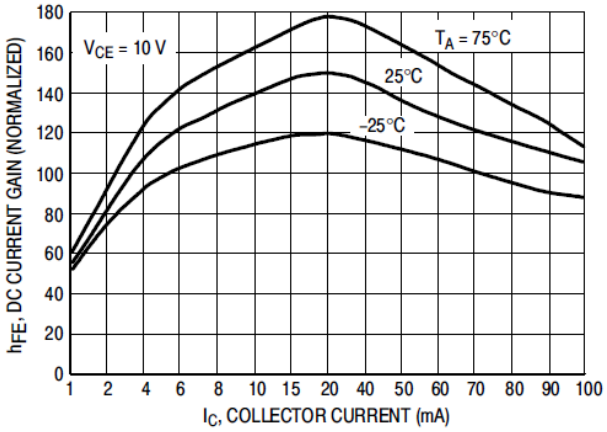


Figure 19. Output Capacitance

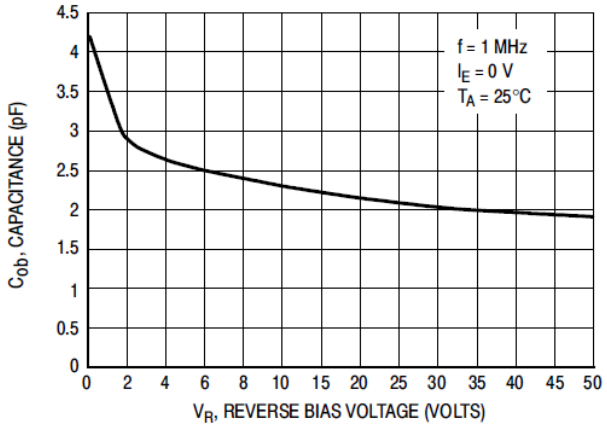


Figure 20. Output Current versus Input Voltage

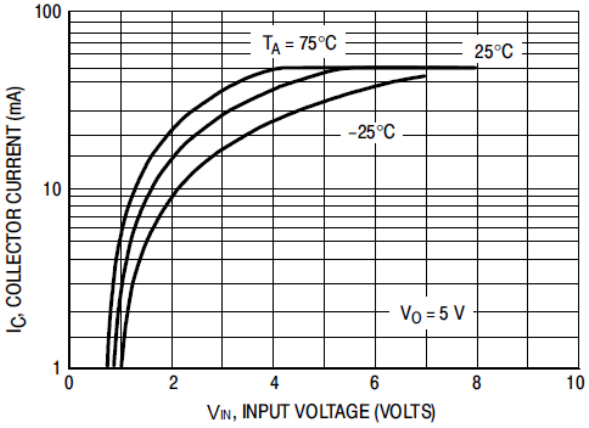


Figure 21 Input Voltage versus Output Current

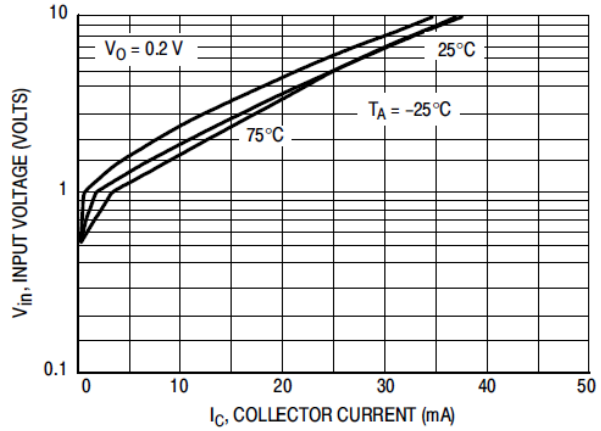
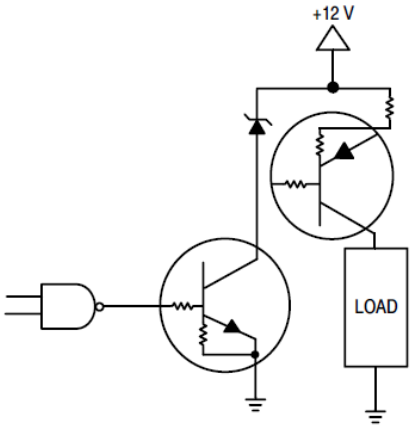


Figure 22 Typical Application for PNP BRTs



MUN5132

Figure 23. Maximum Collector Voltage versus Collector Current

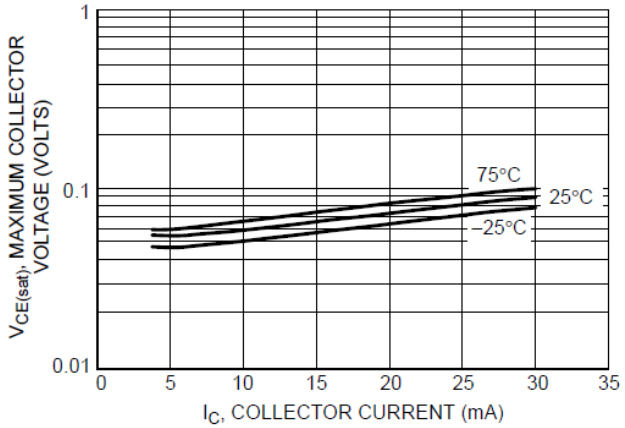


Figure 24. DC Current Gain

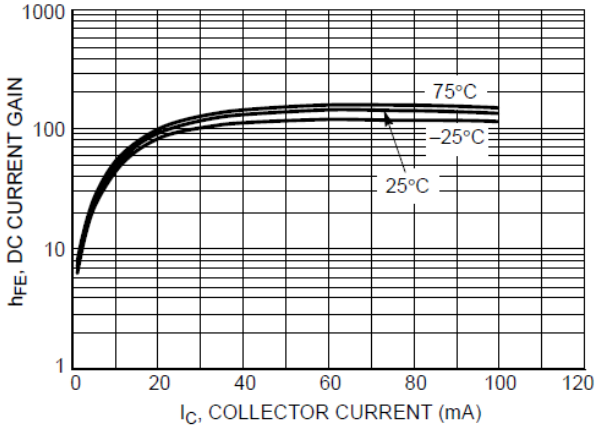


Figure 25. Output Capacitance

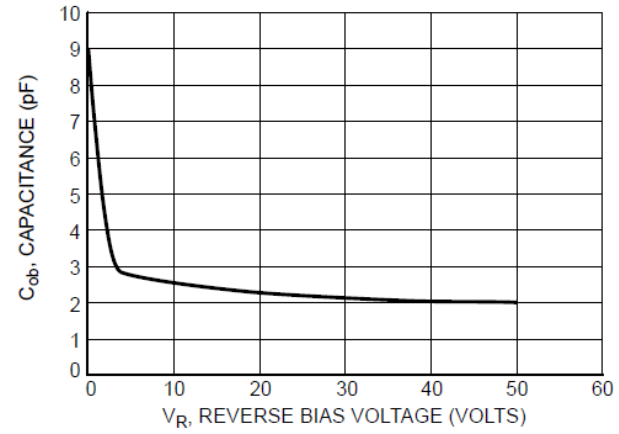


Figure 26. Output Current versus Input Voltage

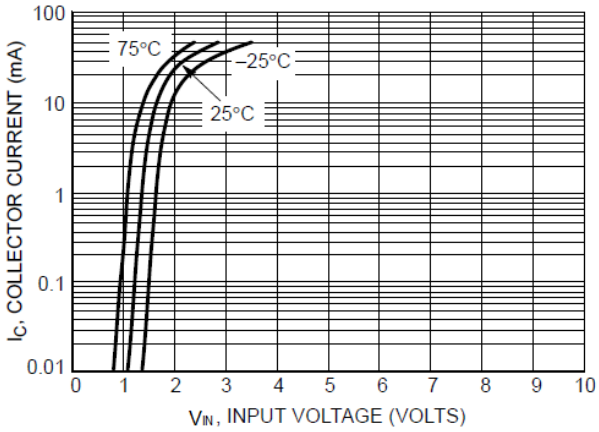
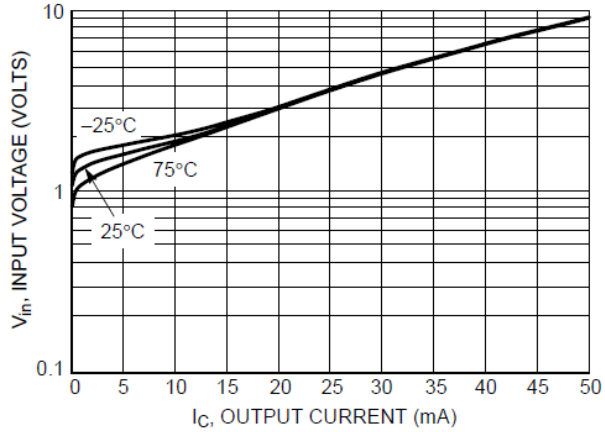


Figure 27. Input Voltage versus Output Current



MUN5136

Figure 28. Maximum Collector Voltage versus Collector Current

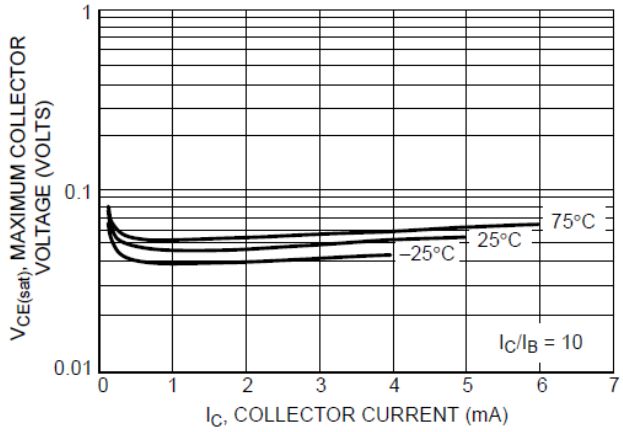


Figure 29. DC Current Gain

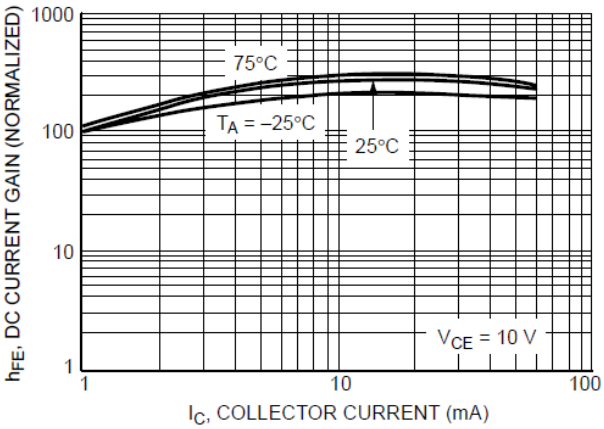


Figure 30. Output Capacitance

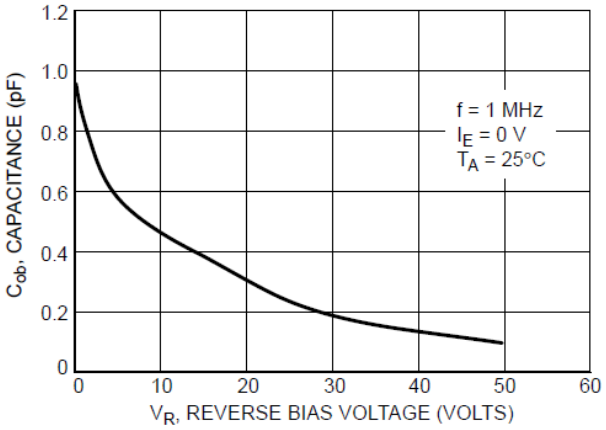


Figure 31. Output Current versus Input Voltage

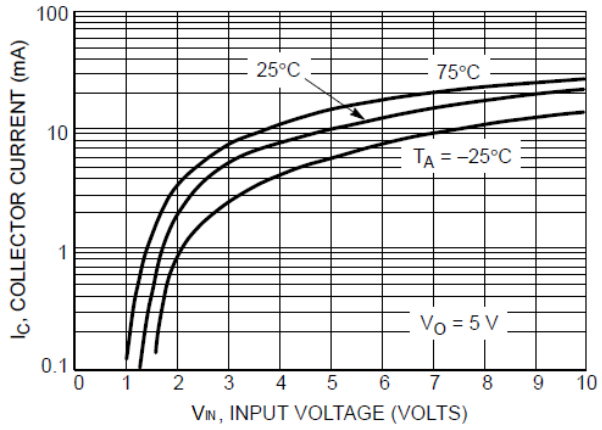
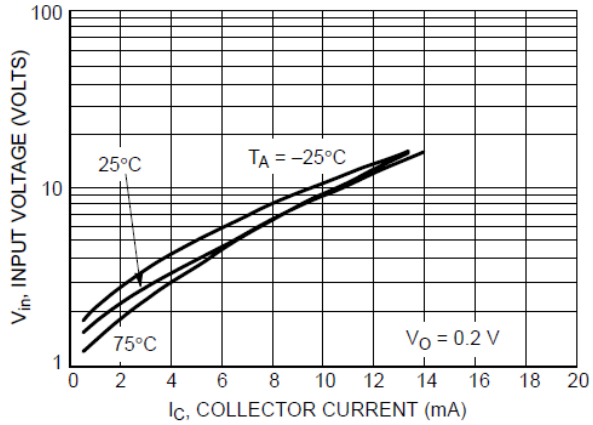


Figure 32. Input Voltage versus Output Current



MUN5137

Figure 33. Maximum Collector Voltage versus Collector Current

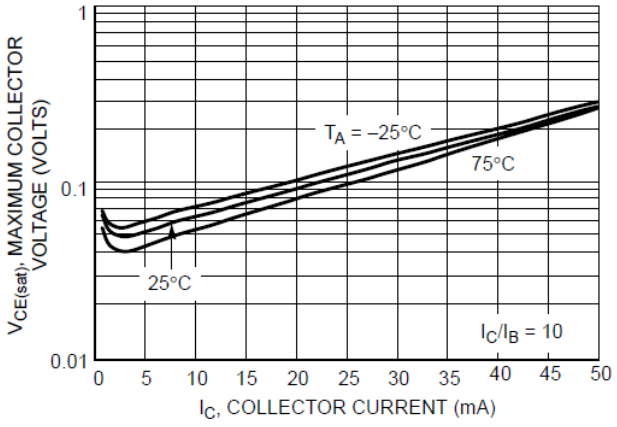


Figure 34. DC Current Gain

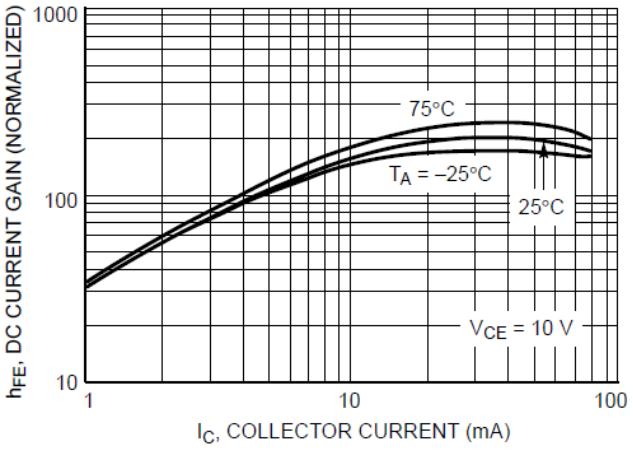


Figure 35. Output Capacitance

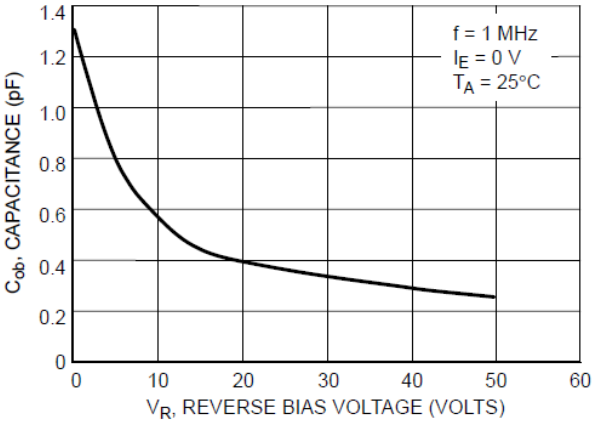


Figure 36. Output Current versus Input Voltage

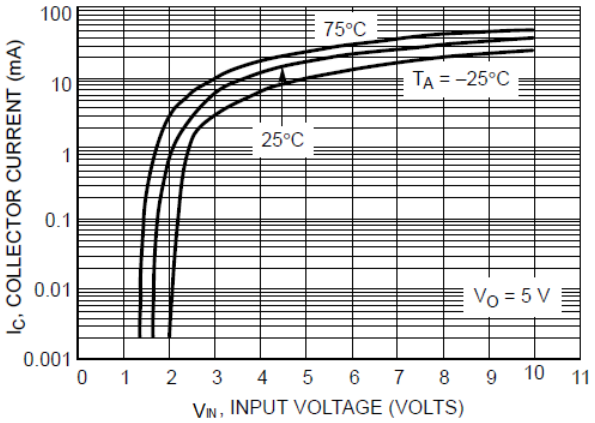
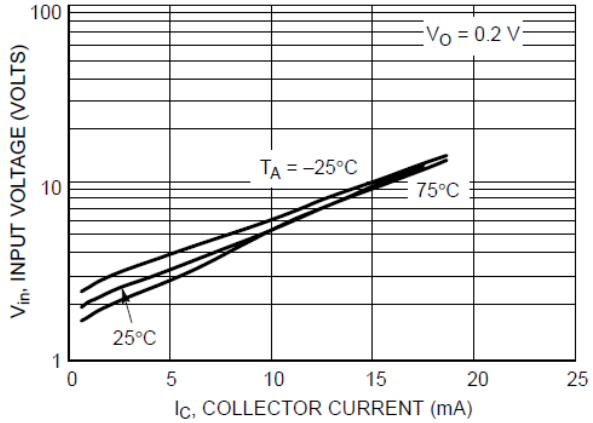
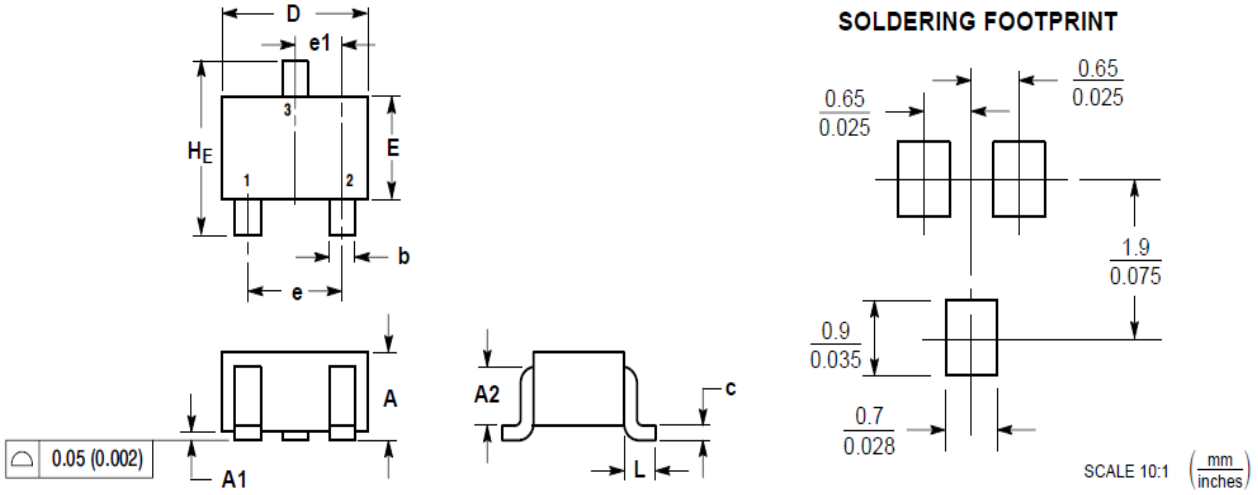


Figure 37. Input Voltage versus Output Current



PACKAGE INFORMATION

Dimension in SC-70 (Unit: mm)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.032	0.040
A1	0.00	0.10	0.000	0.004
A2	0.7 REF		0.028 REF	
b	0.30	0.40	0.012	0.016
c	0.10	0.25	0.004	0.010
D	1.80	2.20	0.071	0.087
E	1.15	1.35	0.045	0.053
e	1.20	1.40	0.047	0.055
e1	0.65 BSC		0.026 BSC	
L	0.425 REF		0.017 REF	
H_E	2.00	2.40	0.079	0.095

IMPORTANT NOTICE

AiT Components (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Components' integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or servere property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Components assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.